

Tactile Sensing for Dexterous Robotic Hands

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Abstract

Robotic systems will be used as precursors to human exploration to explore the solar system and expand our knowledge of planetary surfaces. Robotic systems will also be used to build habitats and infrastructure required for human presence in space and on other planetary surfaces. Such robots will require a high level of intelligence and automation. The ability to flexibly manipulate their physical environment is one characteristic that makes humans so effective at these building and exploring tasks.

The development of a generic autonomous grasping capability will greatly enhance the efficiency and ability of robotics to build, maintain and explore. To tele-operate a robot over vast distances of space, with long communication delays, has proven to be troublesome. Having an autonomous grasping capability that can react in real-time to disturbances or adapt to generic objects, without operator intervention, will reduce the probability of mishandled tools and samples and reduce the number of re-grasp attempts due to dropping.

One aspect that separates humans from machines is a rich sensor set. We have the ability to feel objects and respond to forces and textures. The development of touch or tactile sensors for use on a robot that emulates human skin and nerves is the basis for this discussion. We will discuss the use of new piezo-electric and -resistive materials that have emerged on the market with the intention of developing a touch sensitive sensor. With viable tactile sensors we will be one step closer to developing an autonomous grasping capability.